



1120 Lincoln Street, Suite 801, Denver, Colorado 80203 (303) 894-2100 Fax 894-2109

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SITE INVESTIGATION AND REMEDIATION WORKPLAN

This form shall be submitted to the Director for approval prior to the initiation of site investigation and remediation activities. Form 27 is intended to be used whenever possible. Additional documentation will be required when large volumes of soil and groundwater have been impacted or involve large facilities with multiple source areas. See Rule 910. Attach as many pages as needed to fully describe the proposed work.

OGCC Employee:
Spill Complaint
Inspection NOAV
Tracking No:

CAUSE OF CONDITION BEING INVESTIGATED AND REMEDIATED

Spill or Release Plug & Abandon Central Facility Closure Site/Facility Closure Other (describe):

GENERAL INFORMATION

OGCC Operator Number: 47120
Name of Operator: Kerr-McGee Oil & Gas Onshore LLC
Address: P.O. Box 173779
City: Denver State: CO Zip: 80217-3779
Contact Name and Telephone: Phillip Hamlin
No: (970) 336-3500
Fax: (970) 336-3656
API/Facility No: 445591 County: Weld
Facility Name: Four Way-62N65W/16SEW Facility Number:
Well Name: Well Number:
Location (Qtr, Sec, Twp, Rng, Meridian): SENW Sec 16-T2N-R65W Latitude: 40.141908 Longitude: -104.672677

TECHNICAL CONDITIONS

Type of Waste Causing Impact (crude oil, condensate, produced water, etc.): Oil and Condensate
Site Conditions: Is location within a sensitive area (according to Rule 901e)? [X] N If yes, attach evaluation. Groundwater < 20 ft.
Adjacent land use (cultivated, irrigated, dry land farming, industrial, residential, etc.): Rangeland
Soil type, if not previously identified on Form 2A or Federal Surface Use Plan: Sandy clay (CL) and medium to fine-grained sand (SM)
Potential receptors (water wells within 1/4 mi, surface waters, etc.): Water well approximately 1,050' northwest, livestock approximately 4,000' southeast, and an occupied building approximately 1,350' west.
Description of Impact (if previously provided, refer to that form or document):
Impacted Media (check): [X] Soils [] Vegetation [] Groundwater [] Surface water
Extent of Impact: Unknown
How Determined: Investigation is ongoing

REMEDIATION WORKPLAN

Describe initial action taken (if previously provided, refer to that form or document):
During deconstruction activities at the Four Way-62N65W/16SEW tank battery, soil with historical petroleum hydrocarbon impacts was encountered beneath the southern produced water sump. There were no indications that the dumlines or produced water sump were leaking. The source and volume of the release are unknown and investigation activities are ongoing. A topographic Site Location Map showing the geographic setting of the release is attached as Figure 1.
Describe how source is to be removed:
On April 14, 2016, following removal of the northern produced water sump, one soil sample (N-B01@5') was collected from beneath the sump. The soil sample was submitted for laboratory analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX) and total petroleum hydrocarbons (TPH)-gasoline range organics (GRO) by United States Environmental Protection Agency (USEPA) Method 8260C, TPH-diesel range organics and oil range organics (DRO and ORO) by USEPA Method 8015C, pH by USEPA Method 9045D, and specific conductance (EC) by USEPA Method 9050A. Laboratory analytical results indicated that the pH level in base soil sample N-B01@5', which was collected below the root zone, exceeded the COGCC Table 910-1 allowable level for pH at 9.05. BTEX, TPH, and EC levels in base soil sample N-B01@5' were less than COGCC allowable levels.
On April 19, 2016, following excavation of impacted soil discovered beneath the southern produced water sump, four representative sidewall soil samples (N01@7', E01@7', S01@7', W01@7') and one base soil sample (S-B01@14') were collected from the excavation and submitted for laboratory analysis of BTEX, TPH, pH, and EC. Laboratory analytical results indicated that the benzene concentration in soil sample S-B01@14' exceeded the COGCC Table 910-1 allowable level at 0.24 milligrams per kilogram (mg/kg).
On April 20, 2016, following removal of additional impacted soil from the southern produced water sump excavation, four sidewall soil samples (N02@16', E02@16', S02@16', and W02@16') and one base soil sample (B02@20') were collected from the excavation. Laboratory analytical results indicated that the TPH concentration in sidewall soil sample S02@16' and the benzene, total xylenes, TPH, and pH levels in base soil sample B02@20' exceeded COGCC Table 910-1 allowable levels. On April 21, 2016, following removal of additional impacted soil from the southern sidewall, one sidewall soil sample (S03@16') was collected from the excavation. Laboratory analytical results from S03@16' indicated that BTEX, TPH, pH, and EC levels were compliant with COGCC Table 910-1 allowable levels.
On May 5, 2016, a subsurface assessment was conducted to delineate the lateral and vertical extents of the remaining soil impacts. Using a direct-push drill rig, four soil borings (SB01 through SB04) were advanced around the perimeter of the excavation. One step-out soil boring (SB05) was completed to the north of SB02. The soil borings were advanced to refusal, which occurred at an approximate depth of 28 feet below ground surface (bgs). Two soil samples were collected from each soil boring. One sample was collected at total depth (28' bgs) and one at the depth of the highest photoionization detector (PID) headspace reading. The soil samples were submitted for laboratory analysis of BTEX, TPH, pH, and EC. The TPH concentration in soil sample SB02@20' exceeded the COGCC Table 910-1 allowable level. Concentrations/levels in all the remaining soil samples were compliant with COGCC allowable levels. Soil borings SB01 through SB05 were completed as temporary monitoring wells TMW01 through TMW05 to assess for the presence of groundwater. Groundwater was not encountered in any of the temporary monitoring wells within five days of completion. The temporary monitoring wells were abandoned on May 10, 2016. Soil boring logs with PID headspace readings and temporary monitoring well completion logs are included as an attachment.
(Continued on Page 2)
Submit Page 2 with Page 1.

State of Colorado Oil and Gas Conservation Commission

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Tracking Number: Name of Operator: OGCC Operator No: Received Date: Well Name & No: Facility Name & No:

REMEDIATION WORKPLAN (CONT.)

OGCC Employee:

Describe how source is to be removed (Continued):

In order to remove additional impacted soil from the excavation base, the excavation sidewalls were sloped (2:1 ratio) for stability in accordance with Occupational Safety and Health Administration Excavation Standard 29 Code of Federal Regulations (CFR) Part 1926 Sub-part P Section 1926.652(c)(4). Between June 7 and 9, 2016, following the removal of additional impacted soil, two sidewall soil samples (N03@22' and S04@22'), one base soil sample (B03@25'), and seven test pit soil samples (TP04@28', TP05@30', TP06@35', TP07@30', TP08@35', TP09@30', and TP10@35') were collected from the sloped excavation. Laboratory analytical results indicated that TPH, BTEX, pH, and EC levels were in compliance with COGCC Table 910-1 allowable levels at the lateral extent of the excavation. TPH, benzene, toluene, and/or pH levels continued to exceed COGCC allowable levels in soil sample B03@25' and the test pit soil samples collected from the base of the excavation. Approximately 780 cubic yards of impacted soil were removed from the excavation and transported to the Buffalo Ridge Landfill in Keenesburg, Colorado, for disposal. The general site layout, release location, excavation extent, sloped excavation access, soil sample locations, and soil boring locations are depicted on the Excavation Site Map provided as Figure 2. The soil sample analytical results are summarized in Table 1 and the laboratory analytical reports are attached.

Describe how remediation of existing impacts is to be accomplished, including removal and disposal at an injection well or licensed facility, land treatment on site, removal of impacted groundwater, insitu bioremediation, burning of oily vegetation, etc.:

The impacted soil was transported to the Buffalo Ridge Landfill in Keenesburg, Colorado, for disposal.

If groundwater has been impacted, describe proposed monitoring plan (# of wells or sample points, sampling schedule, analytical methods, etc.):

Following site reclamation, further subsurface assessment will be conducted using a hollow stem auger rig to determine the vertical extent of impacted soil left in-place, and to determine if shallow groundwater has been impacted. If groundwater is encountered, groundwater monitoring wells will be installed to facilitate the groundwater assessment. The monitoring wells will be surveyed so that an accurate groundwater (if present) flow direction can be determined. If groundwater is present, monitoring activities will be conducted on a quarterly basis and all groundwater samples will be submitted for laboratory analysis of BTEX.

Describe reclamation plan. Discuss existing and new grade recontouring; method and testing of compaction alleviation; and reseeding program, including location of new seed, seed mix and noxious weed prevention. Attach diagram or drawing. Use additional sheet for description if required.

The site will be decommissioned and restored to pre-release grade.

Attach samples and analytical results taken to verify remediation of impacts. Show locations of samples on an onsite schematic or drawing.

Is further site investigation required? [X] Y [] N If yes, describe:

Further subsurface assessment activities will be conducted at the site to define the extent of the residual petroleum hydrocarbon soil impacts. If groundwater is encountered while conducting the site assessment, groundwater monitoring wells will be installed and point of compliance will be established. If groundwater is present, monitoring will continue on a quarterly basis. Upon completion of the subsurface assessment activities, a Form 27 Update Report will be provided.

Final disposition of E&P waste (landtreated and disposed onsite, name of licensed disposal facility, recycling, reuse, etc.):

The impacted soil was transported to the Buffalo Ridge Landfill in Keenesburg, Colorado, for disposal.

IMPLEMENTATION SCHEDULE

Table with 4 columns: Date Site Investigation Began, Date Site Investigation Completed, Remediation Plan Submitted, Remediation Start Date, Anticipated Completion Date, Actual Completion Date. Values include 4/20/2016, Active, TBD, and 8-9-16.

I hereby certify that the statements made in this form are, to the best of my knowledge, true, correct, and complete.

Print Name: Phillip Hamlin Signed: [Signature] Title: Senior HSE Representative Date: 8-9-16

OGCC Approved: Title: Date:

Submit reports of site investigation and progress of remediation including results of sampling and analysis on an annual basis or more often until remediation is closed.